

# XN09D61

Silicon PNP epitaxial planar type (Tr)  
Silicon epitaxial planar type (SBD)

For DC-DC converter

## ■ Features

- Two elements incorporated into one package (Tr + SBD)
- Reduction of the mounting area and assembly cost by one half
- Low collector-emitter saturation voltage  $V_{CE(sat)}$

## ■ Basic Part Number

- 2SA2046 + MA3ZD12

## ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

	Parameter	Symbol	Rating	Unit
Tr	Collector-base voltage (Emitter open)	$V_{CBO}$	-15	V
	Collector-emitter voltage (Base open)	$V_{CEO}$	-15	V
	Emitter-base voltage (Collector open)	$V_{EBO}$	-5	V
	Collector current	$I_C$	-1.5	A
	Peak collector current	$I_{CP}$	-3	A
SBD	Reverse voltage	$V_R$	20	V
	Repetitive peak reverse voltage	$V_{RRM}$	25	V
	Forward current (Average)	$I_{F(AV)}$	700	mA
	Non-repetitive peak forward surge current	$I_{FSM}$	2	A
Overall	Total power dissipation *	$P_T$	600	mW
	Junction temperature	$T_j$	125	$^\circ\text{C}$
	Storage temperature	$T_{stg}$	-55 to +125	$^\circ\text{C}$

Note) \*: Measuring on ceramic substrate at 15 mm × 15 mm × 0.6 mm

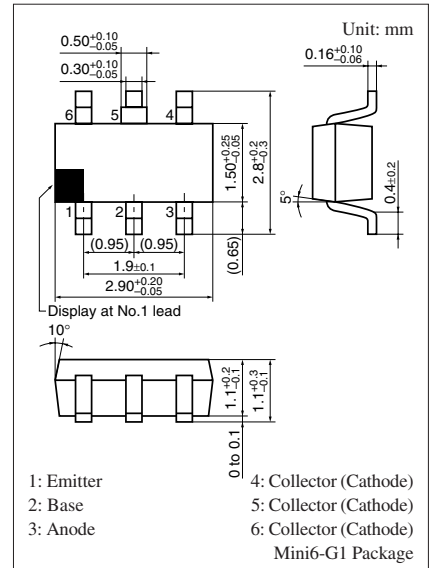
## ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

- Tr

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{CBO}$	$I_C = -10 \mu\text{A}, I_E = 0$	-15			V
Collector-emitter voltage (Base open)	$V_{CEO}$	$I_C = -1 \text{ mA}, I_B = 0$	-15			V
Emitter-base voltage (Collector open)	$V_{EBO}$	$I_E = -10 \mu\text{A}, I_C = 0$	-5			V
Collector-base cutoff current (Emitter open)	$I_{CBO}$	$V_{CB} = -10 \text{ V}, I_E = 0$			-0.1	$\mu\text{A}$
Forward current transfer ratio *	$h_{FE}$	$V_{CE} = -2 \text{ V}, I_C = -100 \text{ mA}$	160		560	—
Collector-emitter saturation voltage *	$V_{CE(sat)}$	$I_C = -750 \text{ mA}, I_B = -15 \text{ mA}$		-90	-200	mV
		$I_C = -1.5 \text{ A}, I_B = -50 \text{ mA}$		-130		

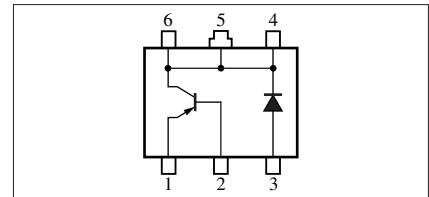
Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

2. \*: Pulse measurement



Marking Symbol: RA

Internal Connection



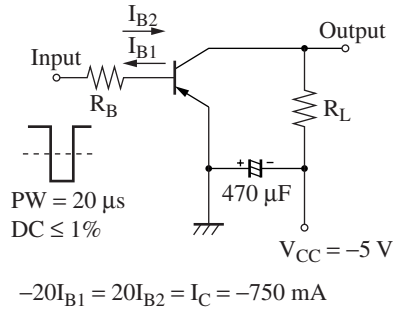
■ Electrical Characteristics (continued)  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

• Tr (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector output capacitance (Common base, input open circuited)	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$		25	35	pF
Transition frequency	$f_T$	$V_{CB} = -2\text{ V}, I_E = 100\text{ mA}, f = 200\text{ MHz}$		270		MHz
Turn-on time	$t_{on}$	Refer to the switching time measurement circuit		25		ns
Storage time	$t_{stg}$			70		ns
Turn-off time	$t_{off}$			15		ns

Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Switching time measurement circuit



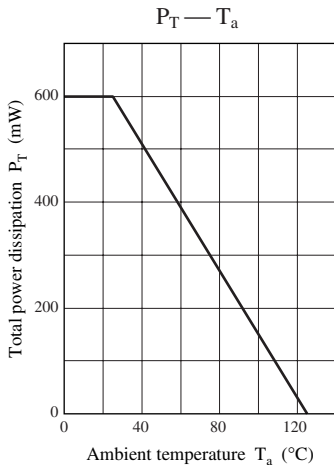
• SBD

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Forward voltage	$V_F$	$I_F = 700\text{ mA}$			0.45	V
Reverse current	$I_R$	$V_R = 20\text{ V}$			200	$\mu\text{A}$
Terminal capacitance	$C_t$	$V_R = 0, f = 1\text{ MHz}$		100		pF
Reverse recovery time	$t_{rr}$	$I_F = I_R = 100\text{ mA}, I_{tr} = 10\text{ mA}$ $R_L = 100\ \Omega$		7		ns

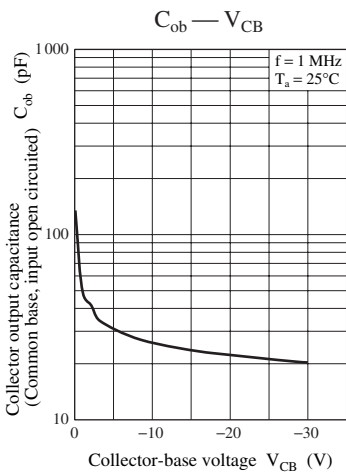
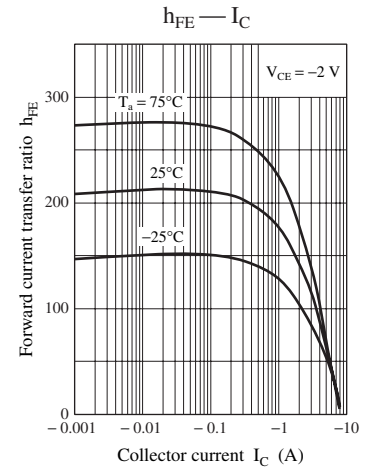
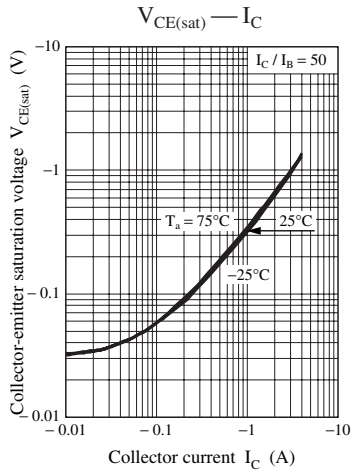
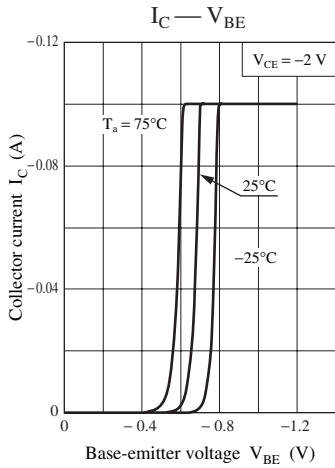
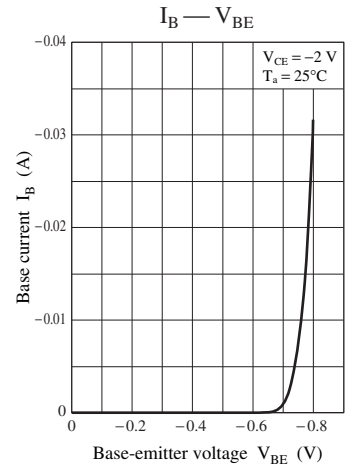
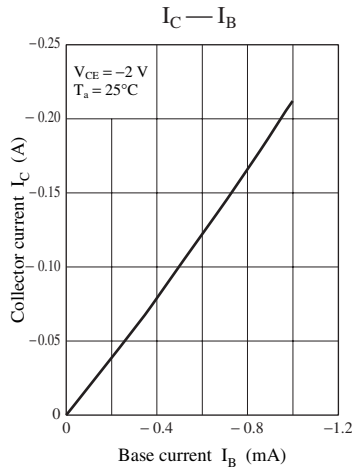
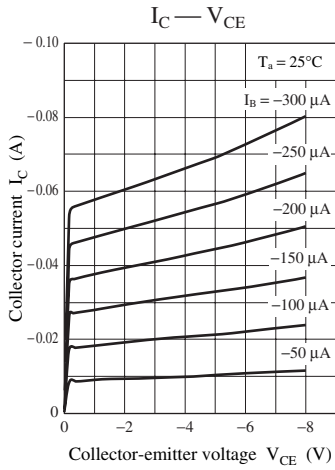
Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7031 Measuring methods for diodes.

2. Schottky barrier diode is frail with static electricity, and it should be kept in safety from shock of static electricity and static electricity level.

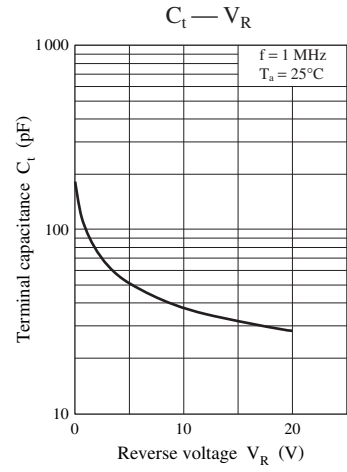
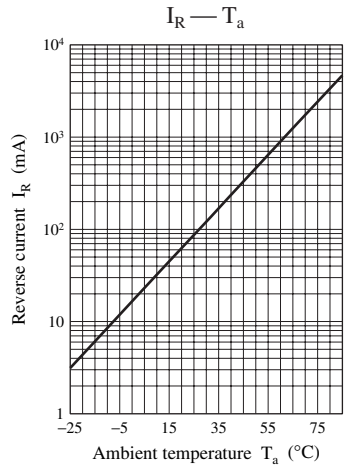
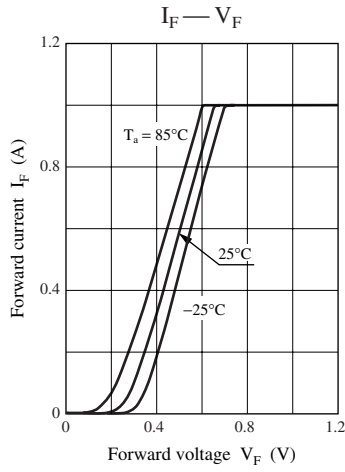
Common characteristics chart



Characteristics charts of Tr



Characteristics charts of SBD



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